In a very large number of designs for hot-blast stoves the attempt is made to circulate the hot gases in cooling and the cold gases in heating, in directions contrary to their natural convection currents.

The accompanying sketches of hot-blast stoves—Hartmann (Fig. 65), Hugh Kennedy (Fig. 66), Macco (Fig. 67), Frank Roberts (Fig. 68), Harvey (Fig. 69)—show that the laws governing the subdivision of currents of hot gases while cooling and cold gases while heating are not very well understood at the present time.

Construction of the Combustion Chamber for a Hot Blast Stove. —In the statements which follow, the attempt has been made to

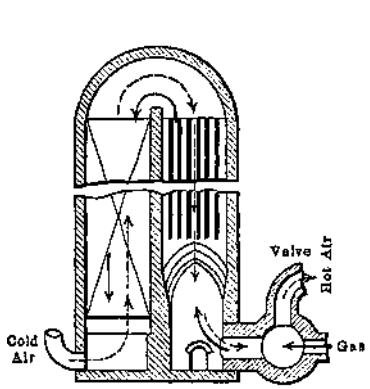

Fig. 66

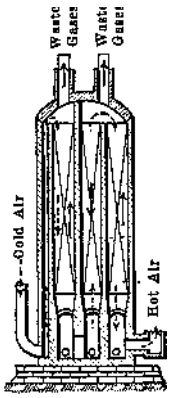

Fig. 67

Combustion Chamber

Fig. 65

show the rational

location of the combustion chamber for a hot-blast stove. For this purpose it is necessary to digress slightly at this point, in order to set forth the rational chamber conditions which are necessary for combustion.

If a flame or jet of burning gases in which the reaction of combustion has not been completed is directed into a cold chamber or upon cold objects, combustion will not be completed, even in the presence of an enormous excess of air. *Theoretical combustion,* without an excess of air, can only be obtained when the reactions of combustion are completed in a chamber where the flame is surrounded by incandescent walls and within which it is held for one or two seconds. The construction of the combustion chamber